

**REMARKS**

The Final Office Action mailed November 14, 2002, has been received and reviewed. Claims 1 through 26 are currently pending in the application. Claims 15 through 20, 23, 25, and 26 are allowed. Claims 1 through 14, 21, 22, and 24 stand rejected. Applicants propose to amend the specification as set forth herein. Applicants respectfully request reconsideration of the application as proposed to be amended herein and in view of the arguments set forth hereinbelow.

**35 U.S.C. § 112 Claim Rejections**

Claims 1 through 10, 21, 22, and 24 stand rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Specifically, the Examiner states that Applicants have not provided any example or any other support in the specification to exclude other elements in the claims. Furthermore, the Examiner states that “[a]ll of the references to the claimed alloys refer to compositions with ‘comprising’ language.” (Final Office Action, page 2). Applicants respectfully traverse this rejection, as hereinafter set forth.

Independent claims 1, 4, 21 include the transitional phrase “consisting essentially of” between the preamble and the body of each respective claim. Applicants note that the transitional phrase “consisting essentially of” occupies the middle ground between the open ended transition “comprising of” and the closed ended transition “consisting of” thereby limiting the scope of a claim to the specified materials and those that do not materially affect the basic and novel characteristics of the claimed invention. (See, e.g., M.P.E.P. § 2111.03 citing *In re Herz*, 537 F.2d 549, 551-52, 190 USPQ 461, 463 (CCPA 1976)).

The Examiner apparently rejects claims 1, 4 and 21 because the transitional phrase “consisting essentially of” is used in each of the claims while the term “comprising” is often used in the specification in disclosing the various compositions of the presently claimed invention. Applicants note that the use of the term “comprising” is a term of art with respect to its use in

claims which, however, does not necessarily carry the legal significance of indicating an open-ended set of elements or steps unless it is being used in the transitional phrase of a claim. For example, the Court of Appeals for the Federal Circuit has noted that when the term “comprising” is used in the body of the claim (*i.e.*, subsequent the transition and among the various recited elements of the claim), the term “[c]omprising” is not used ... as a transitional phrase and has no special legal effect as such.” *Moleculon Research Corp. v. CBS, Inc.* 229 USPQ 805, at 812. Applicants submit that, similarly, the use of the term “comprising” in the specification, including the Summary of the Invention, Detailed Description of the Invention and any specific Examples contained therein, does not carry the same legal effect as it would if it was used in the transition of a claim.

Furthermore, Applicants note that various examples of the compositions, as set forth in the as-filed specification, explicitly disclose “residual amounts” of specific materials/elements along with a “balance” of a specific material/element. Applicants submit that such a recitation may be viewed as inherently supporting the exclusion of other materials from a recited composition.

In other words, the disclosure of a composition having residual amounts of various materials/elements (*i.e.*, those materials/elements which were perhaps not affirmatively added to the composition or whose inclusion was not specifically sought after but which were otherwise present in the resulting composition) combined with the disclosure of a balance of material (*i.e.*, the remaining percentage of the composition) may be seen as indicating that the composition, as recited, is substantially complete and that the presence of other elements, which might materially affect the basic characteristics of the composition, are undesirable.

Applicants, therefore, submit that the as-filed specification provides adequate support for claiming the compositions as set forth in independent claims 1, 4 and 21 of the presently claimed invention, including the use of the phrase “consisting essentially of” in the claims’ transitional phrases. As such, Applicants respectfully submit that claims 1 through 10, 21 and 22 satisfy the requirements of 35 U.S.C. § 112, first paragraph, and respectfully request reconsideration and allowance of the same.

With respect to claim 24, Applicants note that the recitation of gadolinium being present “from about 0.1% to 3.0%” was set forth in claim 24 of the as-filed application. Applicants have proposed to amend the specification herein, specifically paragraph [0020], to affirmatively recite this subject matter in the portion of the application entitled Detailed Description of the Invention. Applicants, therefore, submit that claim 24 complies with the requirements of 35 U.S.C. § 112, first paragraph, and respectfully requests reconsideration and allowance of the same.

### **35 U.S.C. § 102(b) Anticipation Rejections**

#### Anticipation Rejection Based on U.S. Patent No. 4,210,447 to Tsai and the *Metals Handbook*, 9<sup>th</sup> Edition

Claims 1 and 2 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Tsai (U.S. Patent No. 4,210,447) and the *Metals Handbook*, 9<sup>th</sup> Edition. Applicants respectfully traverse this rejection, as hereinafter set forth.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Claim 1 is directed to a gadolinium-containing metal alloy for neutron absorption *consisting essentially of*: gadolinium from greater than 0.1% to 10% by weight; chromium at from about 13% to 18.5% by weight; molybdenum at from about 1.5% to 16% by weight; manganese at from residual amounts to about 3% by weight; nickel at from about 10% to 85% by weight; residual amounts of phosphorus, sulfur, silicon, carbon, and nitrogen; a ferrite content of less than 5% by weight; and a balance of material substantially comprising iron.

The Examiner cites Tsai as teaching an alloy used for dental restoration having a composition which includes 58-58% Ni, 0.01-5% Gd, 18-23% Cr, 10% Mo, 0.01-0.5% Si, 0.01-

0.1% C, and 0.01-0.4% Mn. Further, the Examiner states that residual amounts of Mn, P, S and N would be inherent in such a nickel composition (citing the *Metals Handbook*, 9<sup>th</sup> Edition).

Applicants maintain, however, that Tsai teaches the composition to include various levels of extraneous elements such as tantalum, columbium, titanium and aluminum. (Col. 2, line 64-68). More specifically, the only example given which uses gadolinium is Example 6 (see second table of col. 4) which also includes 3.71% by weight of columbium + tantalum, 0.13% aluminum and 0.09% titanium.

Applicants, therefore, submit that Tsai fails to teach a composition which *consists essentially of* those components set forth in claim 1 of the presently claimed invention since the addition of the above recited elements taught by Tsai would surely alter the claimed alloy and its inherent mechanical, chemical and material properties.

Furthermore, example 6, the only specific composition taught by Tsai to contain gadolinium (which is a presently recited element of claim 1), includes 21.22% chromium which exceeds the cited range of chromium set forth in claim 1 of the presently claimed invention. More specifically, claim 1 of the presently claimed invention recites the element chromium being present from about 13% to 18.5% by weight.

As such, Applicants submit that claim 1 is allowable over Tsai and respectfully request reconsideration and allowance thereof. Applicants further submit that claim 2 is allowable as being dependent from an allowable base claim and respectfully request reconsideration and allowance of the same.

Anticipation Rejection Based on Japanese Patent No. 06192792 to Kajimura et al. and the *Metals Handbook*, 10<sup>th</sup> Edition

Claims 1 and 3 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Kajimura et al. (Japanese Patent No. 06192792) and the *Metals Handbook*, 10<sup>th</sup> Edition. Applicants respectfully traverse this rejection, as hereinafter set forth.

As set forth above, claim 1 is directed to a gadolinium-containing metal alloy for neutron absorption *consisting essentially of* the recited composition.

The Examiner cites Kajimura as teaching a stainless steel having high neutron absorption capacity with a composition by weight of: 0.05-1.0% Gd, 18-26% Cr, 0.1-5% Mo, , up to 2% Mn, 10-22% Ni, up to 0.5% Si, up to 0.02% C and balance Fe with impurities. The Examiner further states that it is inherent that P, S, and N would be present in the steel as impurities (citing the *Metals Handbook, 10<sup>th</sup> Edition*).

Applicants maintain, however, that Kajimura explicitly teaches the composition to be a “boron-containing stainless steel” and, as such, it includes 3.0% boron. Additionally, Kajimura teaches that the composition may include 0.1-5%, independently or in total, of one or more elements among titanium, zirconium and niobium; and 1% each of one or more elements among cadmium, samarium and europium and/or 0.1-5%, independently or in total, of one or more elements among molybdenum, tungsten and vanadium.

Applicants, therefore, submit that Kajimura fails to teach a composition which *consists essentially of* those components set forth in claim 1 of the presently claimed invention as the addition of the above recited elements taught by Kajimura would surely alter the claimed alloy and its inherent mechanical, chemical and material properties.

As such, Applicants submit that claim 1 is allowable over Kajimura and respectfully request reconsideration and allowance thereof. Applicants further submit that claim 3 is allowable as being dependent from an allowable base claim and respectfully request reconsideration and allowance of the same.

Anticipation Rejection Based on Japanese Patent No. 62056557 to Fujiwara et al.

Claims 1 and 3 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Fujiwara et al. (Japanese Patent No. 62056557). Applicants respectfully traverse this rejection, as hereinafter set forth.

As set forth above, claim 1 is directed to a gadolinium-containing metal alloy for neutron absorption *consisting essentially of* the recited composition.

The Examiner cites Fujiwara as teaching a stainless steel for neutron-absorption having a composition by weight of: 0.1-3% Gd, 15-20% Cr, up to 5% Mo, up to 2% Mn, 7-35% Ni, up to P, up to 0.03% S, up to 1.5% Si, 0.1-0.15% C, and up to 0.3% N.

Applicants maintain, however, that Fujiwara teaches that the composition also includes up to 1% titanium and up to 2% niobium. Further, Fujiwara teaches that the composition may additionally contain up to 0.1% cobalt.

Applicants, therefore, submit that Fujiwara fails to teach a composition which consists *essentially of* those components set forth in claim 1 of the presently claimed invention as the addition of the above recited elements taught by Fujiwara would surely alter the claimed alloy and its inherent mechanical, chemical and material properties.

As such, Applicants submit that claim 1 is allowable over Fujiwara and respectfully request reconsideration and allowance thereof. Applicants further submit that claim 3 is allowable as being dependent from an allowable base claim and respectfully request reconsideration and allowance of the same.

Anticipation Rejection Based on Japanese Patent No. 06192792 to Kajimura et al. and the *Metals Handbook, 10<sup>th</sup> Edition*

Claims 4 through 8 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Kajimura et al. (Japanese Patent No. 06192792) and the *Metals Handbook, 10<sup>th</sup> Edition*. Applicants respectfully traverse this rejection, as hereinafter set forth.

Claim 4 is directed to a stainless steel alloy *consisting essentially of*: gadolinium at from about 0.1% to 4% by weight; chromium at from about 13% to 18.5% by weight; molybdenum at from about 1.5% to 4% by weight; manganese at from about 1% to 3% by weight; nickel at from about 10% to 23% by weight; residual amounts of phosphorus, sulfur, silicon, carbon, and nitrogen; and a balance of material substantially comprising iron, wherein the ferrite content of the alloy is less than 5% by weight.

The Examiner cites Kajimura as teaching a stainless steel having high neutron absorption capacity with a composition by weight of : 0.05-1.0% Gd, 18-26% Cr, 0.1-5% Mo, , up to 2%

Mn, 10-22% Ni, up to 0.5% Si, up to 0.02% C and balance Fe with impurities. The Examiner further states that it is inherent that P, S, and N would be present in the steel as impurities (citing the *Metals Handbook*, 10<sup>th</sup> Edition).

Applicants maintain, however, that Kajimura explicitly teaches the composition to be a "boron-containing stainless steel" and, as such, it includes 3.0% boron. Additionally, Kajimura teaches that the composition may include 0.1-5%, independently or in total, of one or more elements among titanium, zirconium and niobium; and 1% each of one or more elements among cadmium, samarium and europium and/or 0.1-5%, independently or in total, of one or more elements among molybdenum, tungsten and vanadium.

Applicants, therefore, submit that Kajimura fails to teach a composition which *consists essentially of* those components set forth in claim 1 of the presently claimed invention as the addition of the above recited elements taught by Kajimura would surely alter the claimed alloy and its inherent mechanical, chemical and material properties.

As such, Applicants submit that claim 4 is allowable over Kajimura and respectfully request reconsideration and allowance thereof. Applicants further submit that claims 5 through 8 are allowable as being dependent from an allowable base claim and respectfully request reconsideration and allowance of the same.

Anticipation Rejection Based on U.S. Patent No. 4,210,447 to Tsai and the *Metals Handbook*, 9<sup>th</sup> Edition

Claims 21, 22, and 24 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Tsai (U.S. Patent No. 4,210,447) and the *Metals Handbook*, 9<sup>th</sup> Edition. Applicants respectfully traverse this rejection, as hereinafter set forth.

Claim 21 is directed to a nickel-based alloy *consisting essentially of*: gadolinium at from about 0.1% to 10% by weight; chromium at from about 13% to 24% by weight; molybdenum at from about 1.5% to 16% by weight; iron at from about 0.01 to 6% by weight; residual amounts of manganese, phosphorus, sulfur, silicon, carbon, and nitrogen; a balance of material substantially comprising nickel wherein the nickel is present at greater than 50% by weight.

The Examiner cites Tsai as teaching an alloy used for dental restoration having a composition which includes 58-58% Ni, 0.01-5% Gd, 18-23% Cr, 10% Mo, 0.01-0.5% Si, 0.01-0.1% C, and 0.01-0.4% Mn. Further, the Examiner states that residual amounts of P, S and N would be inherent in such a nickel composition (citing the *Metals Handbook*, 9<sup>th</sup> Edition).

As noted above, however, Tsai teaches the composition to include various levels of extraneous elements such as tantalum, columbium, titanium and aluminum. (Col. 2, line 64-68). More specifically, the only example given which uses gadolinium is Example 6 (see second table of col. 4) which also includes 3.71% by weight of columbium + tantalum, 0.13% aluminum and 0.09% titanium.

Applicants, therefore, submit that Tsai fails to teach a composition which *consists essentially of* those components set forth in claim 21 of the presently claimed invention as the addition of the above recited elements taught by Tsai would surely alter the claimed alloy and its inherent mechanical, chemical and material properties.

As such, Applicants submit that claim 21 is allowable over Tsai and respectfully request reconsideration and allowance thereof. Applicants further submit that claims 22 and 24 are allowable as being dependent from an allowable base claim and respectfully request reconsideration and allowance of the same.

### **35 U.S.C. § 103(a) Obviousness Rejections**

Obviousness Rejection Based on Japanese Patent No. 06192792 to Kajimura et al. and the *Metals Handbook*, 10<sup>th</sup> Edition

Claims 1 and 3 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kajimura et al. (Japanese Patent No. 06192792) and the *Metals Handbook*, 10<sup>th</sup> Edition. Applicants respectfully traverse this rejection, as hereinafter set forth.

M.P.E.P. 706.02(j) sets forth the standard for a Section 103(a) rejection:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references



themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, **the prior art reference (or references when combined) must teach or suggest all the claim limitations.** The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (Emphasis added).

Claim 1 is directed to a gadolinium-containing metal alloy for neutron absorption *consisting essentially of*: gadolinium from greater than 0.1% to 10% by weight; chromium at from about 13% to 18.5% by weight; molybdenum at from about 1.5% to 16% by weight; manganese at from residual amounts to about 3% by weight; nickel at from about 10% to 85% by weight; residual amounts of phosphorus, sulfur, silicon, carbon, and nitrogen; a ferrite content of less than 5% by weight; and a balance of material substantially comprising iron.

The Examiner cites Kajimura as teaching a stainless steel having high neutron absorption capacity with a composition by weight of: 0.05-1.0% Gd, 18-26% Cr, 0.1-5% Mo, , up to 2% Mn, 10-22% Ni, up to 0.5% Si, up to 0.02% C and balance Fe with impurities. The Examiner further states that it is inherent that P, S, and N would be present in the steel as impurities (citing the *Metals Handbook*, 10<sup>th</sup> Edition).

Applicants note, however, that Kajimura explicitly teaches the composition to be a "boron-containing stainless steel" and as such includes 3.0% boron. Additionally, Kajimura teaches that the composition may include 0.1-5%, independently or in total, of one or more elements among titanium, zirconium and niobium; and 1% each of one or more elements among cadmium, samarium and europium and/or 0.1-5%, independently or in total, of one or more elements among molybdenum, tungsten and vanadium.

Applicants, therefore, submit that Kajimura fails to teach or suggest a composition which *consists essentially of* those components set forth in claim 1 of the presently claimed invention as the addition of the above recited elements taught by Kajimura would surely alter the claimed alloy and its inherent mechanical, chemical and material properties.

As such, Applicants submit that claim 1 is allowable over Kajimura and respectfully request reconsideration and allowance thereof. Applicants further submit that claim 3 is allowable as being dependent from an allowable base claim and respectfully request reconsideration and allowance of the same.

Obviousness Rejection Based on Japanese Patent No. 62056557 to Fujiwara et al.

Claims 1 and 3 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Fujiwara et al. (Japanese Patent No. 62056557). Applicants respectfully traverse this rejection, as hereinafter set forth.

As set forth above, claim 1 is directed to a gadolinium-containing metal alloy for neutron absorption *consisting essentially of* the recited composition.

The Examiner cites Fujiwara as teaching a stainless steel for neutron-absorption having a composition by weight of: 0.1-3% Gd, 15-20% Cr, up to 5% Mo, up to 2% Mn, 7-35% Ni, up to P, up to 0.03% S, up to 1.5% Si, 0.1-0.15% C, and up to 0.3% N.

Applicants note, however, that Fujiwara teaches that the composition also includes up to 1% titanium and up to 2% niobium. Further, Fujiwara teaches that the composition may additionally contain up to 0.1% cobalt.

Applicants, therefore, submit that Fujiwara fails to teach or suggest a composition which *consists essentially of* those components set forth in claim 1 of the presently claimed invention as the addition of the above recited elements taught by Fujiwara would surely alter the claimed alloy and its inherent mechanical, chemical and material properties.

As such, Applicants submit that claim 1 is allowable over Fujiwara and respectfully request reconsideration and allowance thereof. Applicants further submit that claim 3 is allowable as being dependent from an allowable base claim and respectfully request reconsideration and allowance of the same.

Obviousness Rejection Based on Japanese Patent No. 06192792 to Kajimura et al. and the Metals Handbook, 10<sup>th</sup> Edition

Claims 4 through 8 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kajimura et al. (Japanese Patent No. 06192792) and the *Metals Handbook, 10<sup>th</sup> Edition*. Applicants respectfully traverse this rejection, as hereinafter set forth.

Claim 4 is directed to a stainless steel alloy *consisting essentially* of: gadolinium at from about 0.1% to 4% by weight; chromium at from about 13% to 18.5% by weight; molybdenum at from about 1.5% to 4% by weight; manganese at from about 1% to 3% by weight; nickel at from about 10% to 23% by weight; residual amounts of phosphorus, sulfur, silicon, carbon, and nitrogen; and a balance of material substantially comprising iron, wherein the ferrite content of the alloy is less than 5% by weight.

The Examiner cites Kajimura as teaching a stainless steel having high neutron absorption capacity with a composition by weight of : 0.05-1.0% Gd, 18-26% Cr, 0.1-5% Mo, , up to 2% Mn, 10-22% Ni, up to 0.5% Si, up to 0.02% C and balance Fe with impurities. The Examiner further states that it is inherent that P, S, and N would be present in the steel as impurities (citing the *Metals Handbook, 10<sup>th</sup> Edition*).

Applicants note, however, that Kajimura explicitly teaches the composition to be a "boron-containing stainless steel" and, as such, it includes 3.0% boron. Additionally, Kajimura teaches that the composition may include 0.1-5%, independently or in total, of one or more elements among titanium, zirconium and niobium; and 1% each of one or more elements among cadmium, samarium and europium and/or 0.1-5%, independently or in total, of one or more elements among molybdenum, tungsten and vanadium.

Applicants, therefore, submit that Kajimura fails to teach a composition which *consists essentially* of those components set forth in claim 4 of the presently claimed invention as the addition of the above recited elements taught by Kajimura would surely alter the claimed alloy and its inherent mechanical, chemical and material properties.

As such, Applicants submit that claim 4 is allowable over Kajimura and respectfully request reconsideration and allowance thereof. Applicants further submit that claims 5 through 8

are allowable as being dependent from an allowable base claim and respectfully request reconsideration and allowance of the same.

Obviousness Rejection Based on Japanese Patent No. 62056557 to Fujiwara et al. and the *Metals Handbook*, 10<sup>th</sup> Edition

Claims 4 through 8 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Fujiwara et al. (Japanese Patent No. 62056557) and the *Metals Handbook*, 10<sup>th</sup> Edition. Applicants respectfully traverse this rejection, as hereinafter set forth.

Claim 4 is directed to a stainless steel alloy *consisting essentially* of the recited composition.

The Examiner cites Fujiwara as teaching a stainless steel for neutron-absorption having a composition by weight of: 0.1-3% Gd, 15-20% Cr, up to 5% Mo, up to 2% Mn, 7-35% Ni, up to P, up to 0.03% S, up to 1.5% Si, 0.1-0.15% C, and up to 0.3% N.

Applicants note, however, that Fujiwara teaches that the composition also includes up to 1% titanium and up to 2% niobium. Further, Fujiwara teaches that the composition may additionally contain up to 0.1% cobalt.

Applicants, therefore, submit that Fujiwara fails to teach or suggest a composition which *consists essentially of* those components set forth in claim 4 of the presently claimed invention as the addition of the above recited elements taught by Fujiwara would surely alter the claimed alloy and its inherent mechanical, chemical and material properties.

As such, Applicants submit that claim 4 is allowable over Fujiwara and respectfully request reconsideration and allowance thereof. Applicants further submit that claims 5 through 8 are allowable as being dependent from an allowable base claim and respectfully request reconsideration and allowance of the same.

Obviousness Rejection Based on Japanese Patent No. 06192792 to Kajimura et al. and Further in View of U.S. Patent No. 4,292,528 to Shaffer et al.

Claims 9 and 10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kajimura et al. (Japanese Patent No. 06192792), as applied to Claims 4 through 8 above, and further in view of Shaffer et al. (U.S. Patent No. 4,292,528). Applicants respectfully traverse this rejection, as hereinafter set forth.

Claims 9 and 10 each depend from claim 4. As set forth above, Applicants submit that Kajimura fails to teach or suggest a composition *consisting essentially of* the elements set forth in independent claim 4. Applicants further submit that Shaffer fails to teach or suggest such a composition.

Applicants, therefore, submit that dependent claims 9 and 10 are allowable as being dependent from an allowable base claim and respectfully request reconsideration and allowance thereof.

Obviousness Rejection Based on Japanese Patent No. 62056557 to Fujiwara et al. and Further in View of U.S. Patent No. 4,292,528 to Shaffer et al.

Claims 9 and 10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Fujiwara et al. (Japanese Patent No. 62056557), as applied to Claims 4 through 8 above, and further in view of Shaffer et al. (U.S. Patent No. 4,292,528). Applicants respectfully traverse this rejection, as hereinafter set forth.

Claims 9 and 10 each depend from claim 4. As set forth above, Applicants submit that Fujiwara fails to teach or suggest a composition *consisting essentially of* the elements set forth in independent claim 4. Applicants further submit that Shaffer fails to teach or suggest such a composition.

Applicants, therefore, submit that dependent claims 9 and 10 are allowable as being dependent from an allowable base claim and respectfully request reconsideration and allowance thereof.

Obviousness Rejection Based on U.S. Patent No. 3,362,813 to Ziolkowski, in View of U.S. Patent No. 4,010,375 to Wachter and U.S. Patent No. 5,926,516 to Rudnick et al.

Claim 11 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Ziolkowski (U.S. Patent No. 3,362,813) in view of Wachter (U.S. Patent No. 4,010,375) and Rudnick et al. (U.S. Patent No. 5,926,516). Applicants respectfully traverse this rejection, as hereinafter set forth.

Claim 11 as it presently stands states "A spent nuclear fuel storage system configured for thermal neutron absorption and corrosion resistance comprising: a poisoned member, the member being substantially comprised of a *cast* stainless steel alloy," the alloy comprising the recited composition.

The Examiner cites Ziolkowski as teaching wrought austenitic stainless steel alloy used for neutron absorption with the following composition by weight: 0.2-3% Gd, 2-26% Cr, up to 4% Mo, up to 10% Mn, 3.5-22% Ni, 5-25% ferrite, up to 1% P and S, up to 0.25% C, up to 2% Si, and up to 0.7% N.

However, Applicants submit that Ziolkowski fails to teach or suggest a *cast* stainless steel alloy configured for a spent nuclear fuel storage system. Rather, Ziolkowski teaches the opposite. Ziolkowski states, "[t]he alloy of the present invention is particularly well suited for use in providing *wrought* products which may be used where parts having a high thermal neutron absorption cross-section are required." (Column 1, Lines 62-70). Thus, Ziolkowski teaches using a *wrought* stainless steel of the above composition for nuclear applications.

Applicants further submit that there is no motivation to modify the wrought stainless steel alloy used in nuclear applications disclosed in Ziolkowski to a cast form because the purpose of the Ziolkowski invention is that by tailoring the ferrite concentration the alloy is hot workable and therefore wrought products can be produced. Ziolkowski states, "[t]he proper balance of the alloying elements in my alloy is highly critical and must be carefully maintained so as to provide a minimum of about 5% ferrite and no more than about 25% ferrite in the as-cast ingot. Unless this critical balance is maintained the alloy is not hot workable on a commercial scale." (Column 2, Lines 24-29).

Further, Applicants submit that Wachter and Rudnick fail to teach or suggest a *cast* stainless steel alloy configured for a spent nuclear fuel storage system. Rudnick merely teaches that austenitic stainless steels can be used in a fuel assembly storage basin but fails to teach or suggest a cast stainless steel of the composition in claim 11.

Applicant, therefore, submits that claim 11 is allowable over Ziolkowski, Wachter and Rudnick, wither considered individually or in combination, and respectfully request reconsideration and allowance of the same.

Obviousness Rejection Based on U.S. Patent No. 3,362,813 to Ziolkowski, in View of U.S. Patent No. 4,010,375 to Wachter and U.S. Patent No. 5,926,516 to Rudnick et al. and Further in View of U.S. Patent No. 4,292,528 to Shaffer et al.

Claims 12 through 14 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Ziolkowski (U.S. Patent No. 3,362,813) in view of Wachter (U.S. Patent No. 4,010,375) and Rudnick et al. (U.S. Patent No. 5,926,516), as applied to Claim 11 above, and further in view of Shaffer (U.S. Patent No. 4,292,528). Applicants respectfully traverse this rejection, as hereinafter set forth.

Claims 12 through 14 depend from claim 11. As set forth above, Applicants submit that Ziolkowski, Wachter and Rudnick fail to teach or suggest a *cast* stainless steel alloy configured for a spent nuclear fuel storage system. Applicants further submit that Shaffer fails to teach such subject matter.

Applicants, therefore, submit that claims 12 through 14 are allowable as being dependent from an allowable base claim and respectfully request reconsideration and allowance thereof.

Obviousness Rejection Based on U.S. Patent No. 4,592,890 to Burnett

Claims 21, 22, and 24 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Burnett (U.S. Patent No. 4,592,890). Applicants respectfully traverse this rejection, as hereinafter set forth.

Claim 21 is directed to a nickel-based alloy *consisting essentially of*: gadolinium at from about 0.1% to 10% by weight; chromium at from about 13% to 24% by weight; molybdenum at from about 1.5% to 16% by weight; iron at from about 0.01 to 6% by weight; residual amounts of

manganese, phosphorus, sulfur, silicon, carbon, and nitrogen; a balance of material substantially comprising nickel wherein the nickel is present at greater than 50% by weight.

The Examiner cites Burnett as teach a nickel dental casting alloy with a composition by weight of: 78-84% Ni, 0-3% Gd, 11-15% Cr, 0-7% Mo, 0-3% MN, 0-0.8% C, 0-3% Si.

Applicants maintain, however, that Burnett also teaches that the composition to include extraneous elements including about 3-5% vanadium (V), about 1-2% beryllium (Be), and 0-3% of any of aluminum (Al), tin (Sn), lanthanum (La), cerium (Ce), praseodymium (Pr), neodymium (Nd) or samarium (Sm), 0-7% of niobium (Nb), tungsten (W), and titanium (Ti), and 0-1% boron (B). (Col. 1, lines 47-60).

Applicants, therefore, submit that Burnett fails to teach or suggest a composition which *consists essentially of* those components set forth in claim 1 of the presently claimed invention as the addition of the above recited elements taught by Burnett would surely alter the claimed alloy and its inherent mechanical, chemical and material properties.

As such, Applicants submit that claim 21 is allowable over Burnett and respectfully request reconsideration and allowance thereof. Applicants further submit that claims 22 and 24 are allowable as being dependent from an allowable base claim and respectfully request reconsideration and allowance of the same.

Obviousness Rejection Based on U.S. Patent No. 4,210,447 to Tsai

Claims 21, 22, and 24 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Tsai (U.S. Patent No. 4,210,447). Applicants respectfully traverse this rejection, as hereinafter set forth.

Claim 21 is directed to a nickel-based alloy *consisting essentially of*: gadolinium at from about 0.1% to 10% by weight; chromium at from about 13% to 24% by weight; molybdenum at from about 1.5% to 16% by weight; iron at from about 0.01 to 6% by weight; residual amounts of manganese, phosphorus, sulfur, silicon, carbon, and nitrogen; a balance of material substantially comprising nickel wherein the nickel is present at greater than 50% by weight.



The Examiner cites Tsai as teaching an alloy used for dental restoration having a composition which includes 58-58% Ni, 0.01-5% Gd, 18-23% Cr, 10% Mo, 0.01-0.5% Si, 0.01-0.1% C, and 0.01-0.4% Mn. Further, the Examiner states that residual amounts of MN, P, S and N would be inherent in such a nickel composition (citing the *Metals Handbook*, 9<sup>th</sup> Edition).

As noted above, however, Tsai teaches the composition to include various levels of extraneous elements such as tantalum, columbium, titanium and aluminum. (Col. 2, line 64-68). More specifically, the only example given by Tsai which includes gadolinium is Example 6 (see second table of col. 4) which also includes 3.71% by weight of columbium + tantalum, 0.13% aluminum and 0.09% titanium.

Applicants, therefore, submit that Tsai fails to teach or suggest a composition which *consists essentially of* those components set forth in claim 21 of the presently claimed invention as the addition of the above recited elements taught by Tsai would surely alter the claimed alloy and its inherent mechanical, chemical and material properties.

As such, Applicants submit that claim 21 is allowable over Tsai and respectfully request reconsideration and allowance thereof. Applicants further submit that claims 22 and 24 are allowable as being dependent from an allowable base claim and respectfully request reconsideration and allowance of the same.

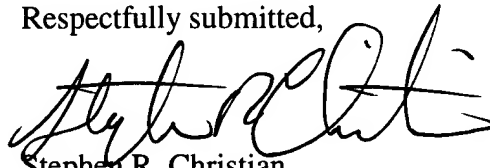
### ENTRY OF AMENDMENTS

The proposed amendments to specification above should be entered by the Examiner because the amendment is supported by the as-filed application and does not add any new matter thereto. Further, the amendments do not raise new issues or require a further search. Finally, if the Examiner determines that the amendments do not place the application in condition for allowance, entry is respectfully requested upon filing of a Notice of Appeal herein.

### CONCLUSION

Claims 1 through 26 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain which might be resolved by a telephone conference, he is respectfully invited to contact Applicants' undersigned attorney.

Respectfully submitted,



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Date: January 8, 2003

Enclosure: Version With Markings to Show Changes Made



Serial No. 09/965,946

**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

**IN THE SPECIFICATION**

Please amend paragraph 20 of the specification as set forth below.

[0020] In an alternative embodiment, wrought and cast nickel-based alloys are disclosed, which can be used for storage of spent nuclear fuel, comprising: a) gadolinium at from about 0.1% to 10% by weight; b) chromium at from about 13% to 24% by weight; c) molybdenum at from about 1.5% to 16% by weight; d) iron at from about 0.01% to 6% by weight; e) residual amounts of manganese, phosphorus, sulfur, silicon, carbon, and nitrogen; and f) a balance of material substantially comprising nickel wherein the nickel is present at greater than 50% by weight. Furthermore, tungsten may be present in the range from about 0.0% to about 4.0%. In the case of the wrought nickel-based alloy, the composition can have a hot forming range from about 800°C to 1200°C. In one embodiment, the iron content can be from about 0.01% to 3% by weight. In another embodiment, some of the other members of the alloy can be restricted to more narrow ranges including chromium at from 20% to 24% by weight; and molybdenum at from about 14% to 16% by weight. If desired, the gadolinium can be further restricted to a range from 0.1% to 3.0% or from 0.1% to 2.0% by weight, depending on the desired properties.

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